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Reasons and recall rate of endodontically treated cases performed by students in Riyadh Elm University - Saudi Arabia

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ABSTRACT

Aims: This study aimed to investigate the reasons and recall rates of endodontically treated cases performed by undergraduate students in Riyadh Elm University (REU) teaching hospital- Saudi Arabia. **Materials and Methods:** In this study, all completed conventional root canal treatment (RCT) of permanent teeth performed by undergraduate students in the Munasiyah campus of Riyadh Elm University from January 2019 to January 2020 were analyzed. In addition, patient age, gender, nationality, reasons for treatment, presence of periapical (PA) lesion, and recall visits data were collected from the electronic filing system used in the teaching hospital. **Results:** A total of 799 cases met the inclusion criteria; 79.7% of them were male. Maxillary premolars were the most frequently treated teeth (31.7%). The most common reason for treatment was irreversible pulpitis (31%), followed by pulpal necrosis (26%). Among these cases, 84% have completed their treatment, and of them, 31.1% returned for recall visits. Gender, age group, pulpal, and periapical diagnosis did not significantly correlate with recall visits. **Conclusion:** The most common reason for treatment is irreversible pulpitis followed by pulpal necrosis. Maxillary premolars were the most frequently treated group of teeth. Moreover, the recall rates post endodontic treatment is low, and long-term recalls must be encouraged.

Keywords: recall, retreatment, endodontics, pulpitis, necrosis, periapical lesion

1. INTRODUCTION

Endodontics has become a routine dental treatment in the last decades since the primary objective of dentistry is to retain natural teeth. However, to understand the disease pattern in different areas of Saudi Arabia and the demands for treatments, studies must be conducted in new institutions to help



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plan health facilities in the future (Mustafa et al., 2016). Several factors influence the best treatment option, including patient-related criteria like age and medical history, as well as tooth-related considerations such as whether the tooth is permanent or primary. Pulp had been exposed to caries, were contaminated by saliva, and had been previously repaired or were not periodontally involved (Asgary and Eghbal 2013). In addition, previous studies suggest a significant correlation between inadequate RCT and both tooth type and root curvature (Alsulaimani et al., 2015). Hence, it is stated that a "clear understanding of dental anatomy including root number and canal morphology is an essential prerequisite in endodontic therapies" (Magnucki, 2019).

Many factors affect the success rate of endodontic therapy. The persistent presence of microorganisms is one of the leading causes of failure (Endo et al., 2013). Due to its complexity, it is considered impossible to disinfect the complete root canal system, contributing to endodontic therapy failure and requiring retreatment (Song et al., 2011). One of the most common indications for root canal therapy is irreversible pulpitis. Dabuleanu (2013) defined it as "pulpal inflammation which will not resolve once the etiology is removed." The symptoms of irreversible pulpitis include intense, lingering, spontaneous, diffuse, or referred pain. A second common type of pulp pathosis is pulp necrosis that can occur either as sterile ischemic necrosis (infarction) caused by disruption of the blood supply at the apical foramen or as infection-related liquefactive necrosis (Lauridsen et al., 2012). Periapical (PA) lesions are associated with endodontics when pulpal necrosis is the leading cause of periapical inflammation or destruction. Moreover, asymptomatic expansion and the ability to cause considerable bone destruction are characteristics of PA lesions of endodontic origin (Davidson et al., 2018).

In a Saudi university clinic study, caries was the most prevalent reason for endodontic treatment, and lower molars were the most commonly treated (Al Yahya et al., 1989). In a more recent study in Saudi Arabia in 2016 in a university clinic, Irreversible pulpitis and pulp necrosis were the most common reasons for initial root canal treatment, while short obturation was the principal reason for failed root canal treatment (Mustafa et al., 2016). A third study in Saudi Arabia in 2003 investigated the reasons for RCT among undergraduate dental students and interns; necrosed pulp (37.0%) was the most common reason, followed by irreversible pulpitis (30.6%) and failed RCT 91 8.5% (Shahid et al., 2003).

To determine the outcome of endodontic treatment, a six-month to 1-year recall appointment is suitable for performing a clinical and radiographic examination of the treated tooth (Ross et al., 2009). However, endodontic treatment's outcome depends on evaluating specific criteria such as the quality of obturation, coronal sealing, and PA tissue response, which can only be investigated during recall visits. In addition, acquiring the number of cases that have been recalled can be subjected to several obstacles (Ross et al., 2009). However, Rubinstein (2000) listed few barriers associated with obtaining recall rates, including patients' mobility, disability, death, and the patients' geographic distance from the endodontic clinics.

In a study conducted by Ross et al., (2009), they found the recall rate was 49% after completion of root canal therapy, and 52% of them were female. In addition, they found that the diagnosis of pulpal necrosis results in a higher recall rate than irreversible pulpitis. Recently, a critical review conducted by da Silva et al., (2019) found that 56% of patients returned for their recall visit, and 52% were female. In addition, patients in the age group 40-52 years had a higher percentage of recall visits. However, because of the lack of data on endodontic patients' recall visits from private university dental clinics, research is needed to investigate the probable causes. Hence the current study aimed to examine the reasons and recall rates of endodontically treated cases treated by undergraduate students in Munasiyah campus of Riyadh Elm University (REU) teaching hospital, Riyadh city, Saudi Arabia.

2. MATERIALS AND METHODS

The DENTOPUS® system is an electronic dental filling system used for data collection via a standardized data collection sheet. The research sample consisted of all completed endodontically treated permanent teeth from January to January 2020 undergraduate dental students in REU- Munasiyah campus. However, endodontically treated cases by interns and post Graduate Residents were excluded. Ethical approval for the study was obtained from the research center of Riyadh Elm University (RC/IRB/2019/303). Permission from the clinical director of the Munasiyah campus was received to access and collect the data from patients' records. The following data were recorded: patient age, gender, tooth number, number of canals, the reason for endodontic treatment, presence of PA lesion, and recall visits. In addition, a standardized excel sheet was prepared to collect the data for further processing. Patient confidentiality was kept by coding the patient files without disclosing patient identities.

Statistical analysis

The collected data were subjected to statistical analysis using Statistical Package for Social Sciences (IBM-SPSS version 22, Armonk, NY: USA) to summarize all variables using descriptive statistics. Moreover, the Chi-square test and Fisher's exact tests were applied to assess the relationship between the categorical variables. A $p < 0.05$ was considered significant for all the statistical tests.

3. RESULTS

The total number of cases that met the inclusion criteria was 799 cases; 79.7% were males, while 20.3% were females. In terms of nationality distribution, 58.4% were Saudis, while 41.6% were non-Saudis. The most common age group was (25-39 years) 49%, followed by (40-54 years) 25% and others (Table 1).

Table 1 Distribution of the study variables (n=799)

Variables		n	%
Gender	Male	637	79.7
	Female	162	20.3
Age group	10 to 24 years	157	19.6
	25 to 39 years	391	48.9
	40 to 54 years	199	24.9
	55 to 69 years	48	6.0
	≥ 70 years	4	.5
Nationality	Saudi	467	58.4
	Non Saudi	332	41.6

The frequency by arch demonstrated higher distribution for maxillary (63.2%) than mandibular (36.8%) arch teeth being included in the study. The maxillary premolar (31.7%) and the maxillary anterior (21.5%) were the most frequently treated teeth groups. In addition, root canal therapy was mainly carried out in a single canal (51.6%), while the least treated was four canals (6.6%). Moreover, 38.4% of cases had periapical lesions in preoperative radiographs. Regarding the treatment completion rate, out of 799 cases, 84% were completed their treatment, and among those completed cases, 31.1% returned for recall visits as shown in (Table 2).

Table 2 Teeth type, number of canals and endodontic treatment variables (n=799)

Variables		n	%
Tooth type group	Maxillary Molars	80	10
	Maxillary Anteriors	172	21.5
	Maxillary Premolars	253	31.7
	Mandibular Premolars	147	18.4
	Mandibular Molars	94	11.8
	Mandibular Anteriors	53	6.6
Teeth with number of canals	One canal	412	51.6
	Two canals	214	26.8
	Three canals	120	15.0
	Four canals	53	6.6
Reasons for treatment	Irreversible pulpitis	244	30.5
	Caries exposure	75	9.4
	Elective RCT	5	0.6
	Trauma	2	0.3
	Previously initiated	132	16.5
	Pulpal necrosis	211	26.4
	Previously treated (substandard RCT)	130	16.3
Periapical (PA) lesion	No	492	61.6
	Yes	307	38.4
Treatment completed	No	128	16.0
	Yes	671	84.0
Recall visited (N=671)	Yes	209	31.1
	No	462	68.9
Total maxillary teeth 505 (63.2%), total mandibular teeth 294 (36.8%)			

The most common reason for root canal treatment was irreversible pulpitis (30.5%), followed by pulpal necrosis (26.4%), while the least reasons were trauma (0.3%) and elective RCT (0.6%); (Figure 1). Drawing an analogy between recall rate and gender, it was found that 31.5% of female patients returned for recall visits, whereas 24.8% of male patients did so. Also, the highest recall rate was found in caries exposure cases (32%) followed by retreatment cases (30.8%), while the least recall rate was seen in trauma and elective RCT (0%), as shown in (Table 3).

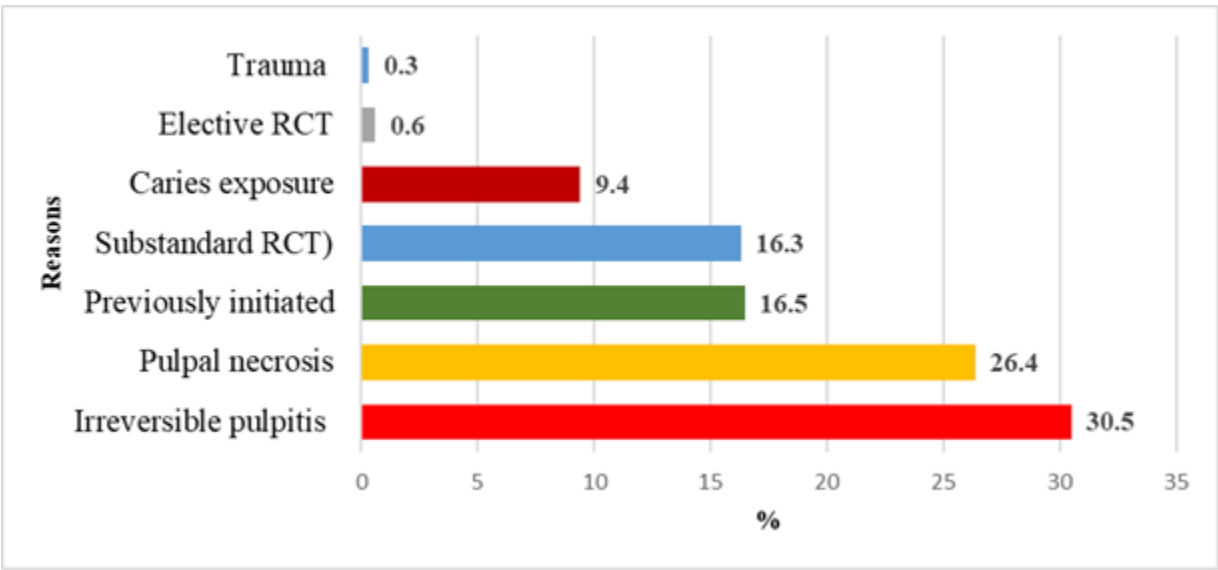


Figure 1 Reasons for root canal treatment

Table 3 Recall rates about the different reasons for treatment

Recall	Irreversible pulpitis	Carious exposure	Elective RCT	Trauma	Previously initiated	Pulpal necrosis	Previously treated (substandard RCT)	p
No	184 (75.4%)	51 (68%)	5 (100%)	2 (100%)	102 (77.3%)	156 (74%)	90 (69.2%)	0.385
Yes	60 (24.6%)	24 (32%)	0 (0%)	0 (0%)	30 (22.7%)	55 (26%)	40 (30.8%)	
Total	244	75	5	2	132	211	130	

Although recall visits were higher in teeth with PA lesions than cases with routine PA diagnosis, no statistically significant correlation was found between recalls and the presence or absence of PA lesion (77 vs. 132, $p=0.585$). Also, males showed higher recall rates than the female gender, but this difference failed to show any statistically significant difference (158 vs 51, $p= 0.084$). Furthermore, the recall didn't present any statistically significant correlation among different age groups [(10 to 24 (50) vs. 25 to 39 (92) vs.40 to 54 (57) vs.55 to 69 (9) vs.≥ 70 (1), $p=0.197$)] or reason for endodontic treatment ($p=0.385$); (Table 3).

4. DISCUSSION

The present retrospective study aimed to investigate the reasons and recall rates of endodontic treated cases conducted by undergraduate students in Riyadh Elm University. The data was collected via revisiting the electronic patients' records by the research team, and around 799 adult cases full filled the inclusion criteria. In the current study, most treated cases were for males. It could be attributed to that Munasiyah dental teaching hospital is the primary training center for male students. This finding differs from a previous study undertaken in Saudi Arabia, where most of the RCTs were done on female patients (Shahid et al., 2003). In addition, maxillary premolars were the most frequently treated teeth, followed by molars and anterior teeth. This finding is different from the study reported by Al Yahia et al., (1999) where molars were the most treated teeth, followed by anterior.

The most common reason for endodontic treatment was irreversible pulpitis (31%), followed by pulp necrosis (26.4%). This finding coincided with previously reported studies (Al Yahya et al., 1989; Dabuleanu, 2013; Mustafa et al., 2016). In contrast to our finding, Shahid et al., (2003) reported that pulp necrosis was the most common reason for RCT, followed by irreversible pulpitis. Regarding the frequency of retreatment cases in our study, it was 16.3% of the overall RCTs, comparable to the previous reports

Shahid et al., (2003). In our study, recall rates were around 31%, which is considered low compared to similar rates reported in the past studies (Ross et al., 2009; da Silva et al., 2019). It was found that 31.5% of female patients returned for recall visits whereas 24.8% of male patients did, which is like Ross et al.'s finding where females returned for recall more than males (52% vs. 44%). However, in the current work, recall rates were not correlated to age group, presence of PA lesion, and any reason for treatment.

One limitation of this study is that most recall visits were conducted within a relatively short period after completing the treatment. Therefore, long-term recall periods are recommended for better evaluation of the outcomes of the treatment. Furthermore, it is not documented clearly in the patients' records if the recall visits were intentionally scheduled by the treating student or due to patients revisiting the clinic for another complaint or routine periodic checkups.

5. CONCLUSION

The current study findings suggest that the main reasons for root canal therapy were irreversible pulpitis and pulpal necrosis. In addition, the recall rate among undergraduate students was low. Hence, attempts should be made to increase the awareness of the importance of recall visits after root canal therapy.

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Contribution

Abdulrahman Baghareeb: conception and design of the study, acquisition of data, analysis and interpretation of data, drafting the article, final approval

Hassan Alsaigh: Acquisition of data, drafting the article, final approval

Abdulmajeed Alsayari: Acquisition of data, revising the paper, final approval

Abdulmajeed Alahmary: Interpretation of data, revising the article, final approval

Fahad Almaziad: Acquisition of data, analysis and interpretation of data, final approval

Muhammed Abuhassna: conception and design of the study, analysis and interpretation of data, final approval

Basil Alamassi: conception and design of the study, analysis and interpretation of data, final approval

Ethical approval

The study was approved by Research Center of Riyadh Elm University (RC/IRB/2019/303), Riyadh, Saudi Arabia

Conflicts of interest

The authors declare that they have no conflict of interest.

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Data Availability

The data used during the current study are available from the corresponding author on request.

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